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Research has found that individuals with depression have a tendency to pull away from their goals prematurely (i.e., disengagement). However, the nature of this relationship is unclear, and there is limited research on the mechanisms linking these constructs. This study examined the mediating role of changing perceptions of goal attainability in explaining the relationship between depression and premature disengagement. Additionally, the influential role of goal importance and goal failures were explored and differential measures of disengagement were examined. Results did not suggest sufficient evidence to conclude that changes in goal attainability perceptions mediate the relationship between depression and premature behavioral disengagement. However, attainability changes negatively predicted subsequent disengagement, discrete attainability predicted subsequent effort and depression predicted initial perceptions of attainability. Moderation models were not supported. This seems to suggest that cognitive factors, such as attainability perceptions, are to some degree relevant in explaining disengagement in the context of depression, which may be helpful in building upon clinically relevant work. Limitations and future directions are discussed.

DEPRESSION AND GOAL DISENGAGEMENT:
THE MEDIATING ROLE OF
GOAL ATTAINABILITY
PERCEPTIONS

by

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CHAPTER I

REVIEW OF THE LITERATURE

“Why bother” is a sentiment many people feel from time to time. When burdened by stress, lethargy or any of a range of negative emotions it can often seem overwhelming or not worthwhile to accomplish the things that need to get done. On the contrary, a positive mood might instill a sense of determination to achieve important goals. Emotions can impact our motivation and drive in a variety of ways, and ultimately impact whether goals are pursued or withdrawn. But why might this be? In order to better understand the interconnected nature of emotion and motivation in goal pursuit, this study will explore certain cognitive factors that may play a role in explaining motivation in the context of emotion – specifically the impact of depression on the relinquishment of goals.

Self-Regulation and Goal Adjustment

Self-regulation has been defined as a process of comparing one’s current state to a desired end state, which influences motivation and planning (Carver & Scheier, 1990). This desired end state is commonly defined by a set of important personal goals, such as finding a romantic partner or graduating college. Goal adjustment, a key sub-component of self-regulation, is the process of modifying which goals are being pursued (Brandtstädter & Renner, 1990). Brandtstädter & Renner (1990) propose a model in which

goal pursuit persists until an obstacle arises that feels insurmountable. Individuals enter an accommodative phase in which they must modify plans, strategies and even values or worldviews in order to adjust to the situation. In this sense, goal adjustment is the process within self-regulation that often involves some form of accommodation to difficulties.

What characterizes adaptive goal adjustment and regulation? Goal adjustment can be broken down further into two distinct processes: goal disengagement and goal reengagement. Whereas disengagement describes the process of ceasing pursuit of a particular goal, reengagement involves selecting new, alternative goals to pursue (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). These constructs are not defined solely by behaviors toward or away from a goal. Rather, a better understanding of these constructs might be as a combination of behavioral effort and psychological commitment (Wrosch, Scheier, Carver & Schulz, 2003). In other words, disengaging from a goal involves not only a reduction in efforts made toward a goal but also a reduction in the drive, desire, or motivation for attaining said goal. For instance, an individual who realizes a certain career track is not reachable may no longer take behavioral steps to reach it, but may still experience a lingering commitment to it, or desire for it, suggesting partial disengagement, only in the form of effort but not commitment. This study will focus on operationalizing disengagement as a change in effort over time, specifically reductions in effort, as that is directly observable and is the first indicator of disengagement.

A variety of work, both cross-sectional and longitudinal, has demonstrated that the ability to adjust goals is associated with greater psychological well-being as well as

physical health (Wrosch et al., 2007). There is evidence to suggest that adaptive adjustment of unattainable goals is associated with a number of benefits. One such study examined personal goals among undergraduates (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Results suggest that some of these benefits include fewer intrusive thoughts, less perceived stress, greater self-mastery and overall greater well-being. Further, in a study of caregivers who were caring for family members with mental illness, researchers found that those with more favorable goal adjustment tendencies displayed lower levels of depressive symptoms, as measured by the CES-D (Wrosch et al., 2011; Radloff, 1977). Another study examined caregivers of individuals with cancer, in which disengagement predicted lower anxiety and stress, and reengagement predicted lower depression (Majestic & Eddington, 2019). Evidence for adaptive goal adjustment has been replicated in lab settings as well. A study involving unsolvable anagrams (representing an unattainable goal) found that goal adjustment tendencies (as measured by the GAS) predicted both affective response and heart rate (Messay & Marsland, 2015). Thus, it is apparent that one's goal adjustment tendencies are associated in some ways with well-being and that, without adaptive goal adjustment, problems may occur.

It has been argued that in the face of unattainable goals, adaptive self-regulation involves disengagement from the unattainable goal, as well as reengagement in alternative goals (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Wrosch et al. (2003) describe the adaptive nature of goal disengagement: it can help one pull away from maladaptive goals as well as pull away from impeding lower priority goals. Research has begun to explore how the relationship between goal adjustment and well-being might

depend on variations in these two processes. For example, a study of reengagement using a community sample found that responding to failure with an acceptance of negative emotions and reengagement in new goals led to improved functioning and happiness (North et al., 2014). Additionally, an examination of career goals among university students found unique beneficial effects from both reengagement and disengagement. With respect to career goals, reengagement was associated with greater goal planning while disengagement was associated with less distress, and both were associated with greater exploration (Creed & Hood, 2014). Another study showed that, in the face of unattainable educational goals, disengagement together with reengagement predicted subjective well-being (Boudrenghien et al., 2012). These lines of evidence suggest that goal adjustment behaviors are directly associated with psychological well-being. Problems with goal adjustment are linked directly to depression, and much of the research in this area has focused on issues with disengagement, which will be the focus of the next section.

Depression and Disengagement

Current research evidence suggests that the relationship between depression and disengagement is particularly complex and that there exists an interesting dichotomy: depression is linked both to the inability to disengage, as well as a facilitator of disengagement, be it adaptive or premature (Wrosch, Scheier, Carver, & Schulz, 2003; Koppe & Rothermund, 2017). Exploring the research behind these two relationships may help to explain possible reasons for this dichotomy and reveal current gaps in

understanding. The relationship between depression and premature disengagement will be the primary focus of this study.

Consider first the idea that depression may result from difficulties reaching an important goal and limited ability to disengage. In this sense, depression and disengagement are negatively related. A recent meta-analysis exploring the association between goal adjustment and quality of life found that higher levels goal disengagement, as measured by the Goal Adjustment Scale (GAS; Wrosch et al., 2013), predicted lower levels of negative indicators of psychological well-being, including depression (Barlow et al., 2019). Further, it has been repeatedly demonstrated that feeling unable to reach a priority goal can result in distress and other associated symptoms and failing to disengage has been associated with the onset of depression (Pyszczynski & Greenberg, 1992; Carver & Scheier, 1990; Wrosch et al., 2004). Depressive states, according to this line of thinking, may result from persistent failures toward a certain goal. In a sense, this transient and mild sadness may serve an adaptive function, pulling one away from a difficult goal that might waste resources. If the goal is in fact unattainable and yet the person does not disengage from it, then theoretically the failures would accumulate, and the transient sadness would turn into a more persistent depression. There exists evidence in the literature suggesting that an inability to disengage is associated with increased likelihood for depression, and in the same vein, pulling away from unattainable goals is associated with improved psychological well-being. Reviews of the literature have demonstrated that lower tendencies to disengage are frequently associated with an increased prevalence of conditions such as depression (Wrosch, Scheier, & Miller, 2013).

Among college students pursuing varying life goals, the ability to reduce effort and commitment (i.e., the key components of disengagement) towards an unattainable goal was associated with lower levels of perceived stress as well as fewer intrusive thoughts (Wrosch, Scheier, Carver & Schulz, 2003). Similarly, multiple studies have confirmed that initial lower disengagement tendencies predict increases in depressive symptoms: among female breast cancer survivors, parents of children with cancer, as well as older adults tracked across 6 years (Wrosch & Sabiston, 2013; Wrosch, Scheier, Miller, Schulz, & Carver, 2003; Zhu et al., 2015). Thus, this body of research implies that depressive symptoms are often associated with lower tendencies to disengage overall, and that this is especially salient for difficult, unattainable goals (i.e., loved ones with illness) and further that this association demonstrates a temporal pattern (i.e., baseline disengagement predicts depression).

Despite the evidence suggesting that depression and disengagement demonstrate a negative association, there also exists evidence for the contrary. Depression has been associated with premature disengagement, such that depression and disengagement demonstrate a positive association, contradicting the body of work discussed previously. Beck (2002) proposed that symptoms associated with depression might serve the adaptive function of pulling an individual away from an unattainable goal, a biological process of resource conservation. A few studies have demonstrated the association in question: that depressive symptoms may also facilitate quicker disengagement from goals. In a study of disengagement from an unsolvable anagram task, results suggested that, compared to controls, individuals with depression showed earlier disengagement from the unsolvable

anagrams, although there were no within group differences for people with depression (Koppe & Rothermund, 2017). Further, a similar study examined state affect directly in the context of unsolvable anagram tasks and found that higher positive mood was associated with longer time until disengagement (Messay & Marsland, 2015). This implies that being in negative mood states, as is characteristic of depression, may then be associated with earlier disengagement from a goal. Research by van den Elzen and MacLeod (2006) suggests that this association between depression and disengagement extends into cognition as well. They examined differences between students with low and high depression scores and evaluated their ability to disengage from an initial learning style to focus on a new learning style. Individuals with higher levels of depressive symptoms performed better in the relearning phase and were thus better able to cognitively disengage from the initial procedure.

While research on depression and disengagement has resulted in contradictory findings, there is a hypothetical theoretical resolution. Depression may sometimes initiate from an inability to disengage from an unattainable goal. This may be particularly true for goals that are related to self-identity, intrinsically motivating (i.e., fulfill inherent needs), or especially important, as might be inferred from studies above surrounding loved ones with illnesses. A review of both cross-sectional and prospective studies found numerous reports indicating that progress on self-concordant or intrinsic goals (i.e. goals that align with ones self-view or one has an internal drive to pursue) -- as opposed to non-self-concordant goals -- are associated with greater goal attainment, improved well-being, positive affect, and even less depression (Kelly et al., 2015). While the initiation of

depression could theoretically help pull an individual away from the unattainable goal, it may later lead to premature disengagement from other current goals that are easier to withdraw from, resulting in the withdrawal characteristic of depression (i.e. limiting social interaction and behavioral activity).

Thus, the difficulties with self-regulation that one experiences may change depending on the current phase of depression or on certain aspects of the goal. Unfortunately, past research has not examined goal adjustment as it relates to varying stages of depression, nor have comparisons been made in this relationship across different goal types. In order to better understand why depression is linked to premature disengagement, it is important to understand the pathways linking these constructs. As explained above, behavioral disengagement can be directly observed as a reduction in behavioral effort. Given the relationship observed between depression and disengagement, theories that may help explain this association will be considered next.

Depression and Disengagement: Applying Motivational Intensity Theory

Recall that disengagement involves a reduction in both psychological commitment as well as behavioral effort towards a goal. If depression influences behavioral effort, then it might theoretically also influence behavioral disengagement to some degree. Thus, to better understand what influences behavioral disengagement, constructs that are associated with changes in effort will be examined. Motivational intensity theory (MIT) describes the factors influencing the amount of effort one puts into a task (Brehm & Self, 1989) and has been used as a framework for understanding

depression. The theory argues that because higher difficulty tasks require more resources, the amount of effort will be proportional to the level of difficulty (Richter et al., 2016).

Research in this domain has examined effort both physiologically and behaviorally. Many studies have relied on blood pressure as an objective physiological measure of effort, with higher blood pressure levels reflecting greater effort. Various measures of cardiac activity have led to a number of key findings: blood pressure is associated positively with task difficulty, depressive symptoms were positively associated with a slowing of the cardiac pre-ejection period (PEP), and individuals with depression demonstrate higher SBP activity for easier tasks and lower activity for harder tasks (Wright & Dill, 1993; Silvia et al., 2016; Silvia et al., 2014).

Disengagement in the Context of MIT

Rather than relying on physiological measures of effort, the current study relies on behavioral performance on a task to quantify effort. The task in question has an unfixed difficulty, such that individuals can choose from a range of difficulties. In line with MIT, people are expected to aim for the highest performance level that is both possible (i.e., difficulty) and worthwhile (i.e., important) (Richter et al., 2016). Perceptions of difficulty and importance both influence effort expenditure. Individuals will put in increasing effort for increasing difficulty, but only up to the point that is still worthwhile. Support for MIT has been present in a number of different studies examining unique relationships. For instance, a study involving a computer task with self-paced difficulty found that incentive value was positively associated with difficulty pursued, which in turn predicted effort as measured by heart rate (Wright et al., 2002). In other

words, the reward value influenced the level of difficulty participants would accept, thus modifying effort expended. Additionally, numerous other studies have demonstrated that the effort one puts in depends on both difficulty of the task and incentives for success, as MIT predicts, as well as how uncertain one is about the difficulty or their abilities (Richter, 2012; Wright, 1998; Brehm & Self, 1989; Richter & Gendolla, 2006). Even further, some research has demonstrated that these associations may depend on mood (Gendolla et al., 2012). MIT serves as a useful framework for understanding the ways in which perceptions about a task influence behavioral effort. If these perceptions about goals influence effort, then it may be that as these perceptions change, so too does effort, thus leading to some level of behavioral disengagement.

MIT in the Context of Depression

While MIT provides useful insight into the determinants of behavioral effort, how might these associations be unique in the context of depression? Research in this domain has also considered the impact that depression might have on behavioral effort. In a study examining cost-benefit decision-making, individuals with depression chose fewer higher cost tasks, despite higher rewards (Treadway et al., 2012). In another study, anhedonia, one of the hallmark features of depression, was the strongest predictor of difficulty choice when participants were asked to choose among multiple tasks for varying incentives (Treadway et al., 2009). Individuals demonstrating higher levels of anhedonic symptoms chose the easier tasks more frequently even though those tasks involved a less significant reward.

One behavioral measure that has been frequently used in studies of effort-based decision-making is known as the Effort Expenditure for Rewards Task (EEfRT; Treadway et al., 2009). This task is a series of trials that require pressing a button rapidly within a limited time period in order to receive an opportunity to win a small monetary reward (incentive amounts vary by trial). The task is simple and was designed such that individual differences in ability or fatigue would not impact task choice. Before each trial, participants are told the likelihood that completing the task results in reward and are asked to choose between a harder and easier task. This task can measure behavioral effort by examining how often participants choose the “hard” task, and disengagement could be defined as the reduction in the proportion of hard tasks chosen over time. Not surprisingly, people tend to choose the hard task rather than the easy task when the probability of winning is higher (88%) and when the potential reward is larger.

In an initial validation study (Treadway et al., 2009), researchers found that participants with higher trait anhedonia were less likely to choose the hard task, but this relationship was qualified by a 3-way interaction. Participants with higher anhedonia tended to make fewer hard task choices when the potential reward was higher, and the probability of winning was uncertain (50%). In other words, under a high reward/uncertain outcome condition, participants with higher anhedonia were less willing to invest effort. This work helps to integrate findings from the two domains of effort and reward-based research. Effort expenditure depends partly on perceived likelihood of success (which in this task is based partly on the explicit probabilities presented for each trial) and partly on how important or valuable the outcome seems, consistent with the

expectancy-value theory of motivation (Eccles et al., 1983; Wigfield, 1994).

Theoretically, as perceptions about success change, so too might effort, resulting in disengagement.

In summary, behavioral effort expended is influenced both by perceived effort required (i.e., task difficulty), as well as incentive for success (i.e., task importance). The EEfRT task demonstrated that factors influencing difficulty (such as probability of success) and importance (such as incentive value) influence behavioral effort, and that this is moderated by certain depressive symptoms (i.e., anhedonia). It may be that depressive symptoms, including anhedonia, influence perceptions of task difficulty and likelihood of success, thereby modifying the amount of effort put into the task. Thus, disengagement occurs in the form of reduced behavioral effort. It is also clear from the evidence that perceptions of the goal, such as perceptions of difficulty, influence overall effort, and therefore engagement. It might be reasonable to conclude that the association between depression and disengagement may be explained by these perceptions about the goal. This may be due to alterations in how people with depression respond to information about the task or how they respond to failure. Although research has yet to examine these mechanisms thoroughly, this study aims to analyze this possibility in an exploratory manner. The next section focuses on the role of cognitive biases in depression and how those biases may impact perceptions about goals, thereby impacting behavioral disengagement.

Alterations in Goal Appraisals and Perceptions

Goal appraisals are defined as evaluations of the current state of goal pursuit and how well it is going (i.e., progress) (Ghassemi et al., 2017). Some of the key components of goal appraisals include perceptions of importance, progress, and attainability. For instance, appraisals of attainability capture one's expectations about task difficulty and likelihood for success that have been described above. One possible explanation for the association observed between depressive symptoms and premature disengagement is that depression modifies how attainable or important a goal seems, perhaps through skewed reactions to feedback on goal progress, and in turn influences disengagement via reductions in behavioral effort. If this is the case, then depressive symptoms should be associated with modified perceptions of goals, as well as more significant changes in these perceptions in response to difficulties, and in turn modified perceptions of goals should impact behavioral disengagement.

Goal Appraisals and Depressive Symptoms

Research has demonstrated that depressive symptoms are associated with perceptions and appraisals of goals. One such study found that among women undergoing infertility treatment (i.e., a goal of having a child), positive affect was positively associated with appraisals of goal attainability and importance across six time points, and the reverse was true of negative affect (Salmela-Aro & Suikkari, 2008). Additionally, they found that attainability assumptions were negatively associated with depressive symptoms: those with higher levels of depression perceived their goal as less attainable. Another study attempted to delineate distinct profiles of mental health severity among

mood and anxiety disorders (Coulombe et al., 2016). They found that those in the group with the most severe symptomatology exhibited more negative appraisals of their goals overall. These appraisals were measured among six dimensions (meaningfulness, manageability, progress, support, stress, and enjoyment) using the Personal Project System Rating Scales.

Similarly, another study comparing depressed participants to controls examined differences in goal expectancies (Dickson et al., 2016). They found that individuals in the depressed group rated their desirable goals as less likely to be reached, and also rated undesirable outcomes as more likely to occur. This seems to suggest that individuals with depression might view the desirable aspects of certain goals as less likely to occur, and thus less attainable.

In a study of students' educational goals, it was found that the relationship between goal commitment and subsequent depressive symptoms was moderated by perceptions of attainability (Boudrenghien et al., 2012). In other words, goal commitment did not contribute to well-being when goals were perceived to have low attainability. Further, it was also found in the same study that commitment to a goal that is perceived unattainable was negatively associated with self-mastery and perceptions of control in life.

In considering these findings, it seems that several key conclusions can be drawn. For one, depressive symptoms appear to demonstrate a negative association with appraisals of attainability. When goal pursuit is going well, this tends to be associated with positive affect and favorable goal attainability, but when it is not going well

attainability perceptions may change to become more negative, and research suggests this association is more salient among individuals with depression. Further, perceptions of attainability appear to have a direct relationship with effort, so as attainability declines, theoretically so too does effort, and thus disengagement behaviors occur. The question still remains as to whether or not perceptions of attainability directly influence disengagement behavior. While importance appraisals are certainly involved in the disengagement process, attainability specifically appears to be implicated in multiple facets of disengagement, sharing a direct association with affective symptoms and the processes of goal pursuit and adjustment. Therefore, perceptions of goal attainability may play a key role in explaining the connection between depression and premature behavioral disengagement.

The Present Study

Summary of Findings

In reviewing this evidence, it is clear that depression is associated with variations in goal adjustment tendencies, and that depression can be thought of as a condition characterized by premature disengagement from goals. However, research on these associations is limited, sometimes demonstrates conflicting findings, and the underlying mechanisms are not well understood. Given the influence of depression on cognition, it may be that certain cognitive aspects of goal pursuit, such as biased goal appraisals, may partially explain the effects of depression on behavioral disengagement. Motivational Intensity Theory suggests that aspects inherent to perceptions of attainability (i.e., difficulty, likelihood for success) and importance (i.e., desire, reward sensitivity) may

drive the effort one puts forth. Thus, changes in these perceptions could then influence changes in effort (i.e., behavioral disengagement). Research that has operationalized behavioral disengagement as a reduction in behavioral effort, especially studies using the EEfRT task, further demonstrated that both likelihood for success and task difficulty influence behavioral effort. Additionally, studies with the EEfRT revealed that perceptions of difficulty might be greater for individuals with depression, making a goal seem less attainable. As result, as they experience difficulties, they may view the goal as less attainable, resulting in reduced behavioral effort, thereby behaviorally disengaging.

Study Aims

By better understanding how perceptions of goals, such as attainability, and conditions of mood, such as depression, impact effort, we may better illuminate the mechanisms through which reductions in effort (i.e., behavioral disengagement) occur. The primary aim of this study is to explore the mediating effects of changes in goal attainability on the relationship between depressive symptoms and behavioral disengagement. Although previous studies have looked at components of this proposed causal relationship, no previous work has examined them together in a single study. Relying on a novel approach to using the EEfRT task, participants completed multiple rounds of task trials, and were asked to rate perceived attainability – specifically their expectations for success – as well as perceived importance. Through this multi-session approach, I was able to build on past work by examining not only how goal perceptions directly relate to effort within a given session, but also how these perceptions might change over time and subsequently how effort changes. Additionally, this study also

examined the potential moderating effects of goal importance on the relationships between attainability change and disengagement. This study was also able to expand upon past work by exploring how attainability perceptions for a specific task differ for individuals with and without depression and how those perceptions change across multiple task trials. It may be that individuals view task failures as indicators of lower attainability, and this association may be stronger for individuals with depression, in which their perceptions of attainability reduce to a greater degree after failure. As such, this study will also examine an exploratory hypothesis of the impact of failures on attainability over time, as well as the moderating role of depression. Finally, disengagement has been operationalized in different ways (i.e., using behavioral measures and self-report scales), but no research has determined if these diverse forms of measurement show concurrent validity. This study will also explore this relationship using a measure of general disengagement tendencies, in addition to measuring behavioral disengagement with the EEfRT task.

Hypotheses

This study has three primary hypotheses:

1. The central hypothesis describes a model explaining the relationship between depression and behavioral disengagement through attainability perceptions.

Additionally, this model considers the role of failures in these relationships, as an exploratory component. It was expected that depression would be associated with both discrete attainability perceptions, as well as changes in attainability perceptions, but that these two relationships would follow different pathways. As

such two models were created and their relative hypotheses are described below. Given the complexity of these models, several sub-hypotheses about the pairwise relationships between variables were also explored:

- a. The first model describes proposed relationships with discrete attainability: it was expected that depression would show a positive relationship with behavioral disengagement, and that this will be partially mediated by discrete attainability (see Figure 1). It was predicted that individuals with higher ratings of depression would demonstrate lower discrete perceptions of attainability overall, across each time point. It is partly via this model that increasing depressive symptoms predict greater behavioral disengagement. However, based on findings from past research, it was expected that depression would also have a direct bivariate relationship with behavioral disengagement.
- b. The second model describes proposed relationships with changes in attainability: increasing failures predict greater reductions in attainability, moderated by depression, and in turn attainability reductions predict greater behavioral disengagement (see Figure 2). With regards to moderation, individuals with higher levels of depressive symptoms were expected to show greater reductions in attainability in response to failure. There were also several assumptions about the pairwise relationships in this model: it was expected that attainability perceptions would predict subsequent effort, such that the more attainable the task seems the more

effort one will then put in. Thus, if there was a change in effort, it was hypothesized to follow a change in attainability perception.

2. Given the relationship of goal importance with disengagement, it was expected that goal importance would moderate the association between changes in perceptions of attainability and behavioral disengagement. In line with MIT, it was hypothesized that attainability perceptions will predict effort on the subsequent task. Any changes in effort (i.e., behavioral disengagement) were expected to also be predicted by changes in attainability perceptions. Individuals who viewed the goal as more important were predicted to show a weaker negative association between attainability and disengagement.
3. Measures of general goal disengagement tendencies were predicted to be positively associated with behavioral disengagement, as measured by reduction in task effort.

CHAPTER II

METHODS

Participants

Participants were recruited from an undergraduate sample at the University of North Carolina Greensboro, using the SONA Experiment Scheduling System. This study focused on adult populations and as such only participants age 17 and over were included. Further, this study included a measure of depression in mass screening (i.e. a set screening of measures completed by SONA participants to determine their eligibility for studies with certain inclusion criteria) to oversample for higher levels of depression, in an effort to increase variability on depressive symptoms. Data were collected from a total of 167 participants. Participant data were excluded if they were missing a significant amount of data from measures of any of the primary constructs. Thirty-one participants were excluded for having completed only one of the two required sessions on the EEfRT task, and two were excluded for not completing the surveys. After all exclusions, 134 participants remained in the sample for analysis, 6 of which came from mass screening¹.

¹ Participants in mass screening completed the CES-D (Radloff, 1977). Individuals scoring above 16 were invited via email to participate (N = 287). 58 responded to initial emails and 8 completed scheduling procedures.

Materials

Depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was chosen as a measure of overall depressive symptomatology. It is a 20-item assessment that asks questions about thoughts and behaviors during the past week. Items are rated on a 4-point Likert-type scale, from zero to three points (see Appendix A). Its reliability, concurrent validity, and construct validity have been well established (Radloff, 1977; Hunter et al., 2003). This measure demonstrated acceptable internal consistency within the given sample (Cronbach's $\alpha = 0.90$)

General Disengagement Tendencies

The Goal Adjustment Scale (GAS; Wrosch, Scheier, Miller, Schulz, & Carver, 2003) was administered at baseline. This questionnaire contains ten items assessing the ways in which people react when forced to stop pursuing a goal. Items are rated on a 5-point Likert type scale. The GAS is composed of two subscales: Goal Disengagement and Goal Reengagement. Scores are calculated by summing the items pertaining to each scale, and reverse coding when necessary (see Appendix B for full measure). The GAS has demonstrated good reliability and validity (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). This measure demonstrated acceptable internal consistency within the given sample (Chronbach's $\alpha = 0.76$), as did the subscale for disengagement (Chronbach's $\alpha = 0.73$).

Effort and Behavioral Disengagement: The EEfRT Task

The Effort Expenditure for Rewards Task (EEfRT; Treadway et al., 2009) involves completing multiple trials of a simple key-press task. On each trial, participants are initially presented with a 1 s fixation cross (+), followed by a prompt to choose between an “easy” task or a “hard” task. They are given 5 s to enter a choice, after which a choice is randomly selected if the participant does not enter one. The “easy” task requires that participants make 21 button presses within 7 s, using their dominant index finger. The “hard” task requires participants to make 67 button presses in 21 s, using their non-dominant pinky finger. While making the difficulty choice, they are also told the probability of winning money from that particular trial, as well as the value of the reward for each respective task (\$1.00 for successful “easy” tasks and a range of \$1.24-\$4.30 for successful “hard” tasks). The ‘probability-of-winning’ levels include: “low” (12%), “medium” (50%), and “high” (88%); thus, successful completion of the key-press trial does not guarantee winning. There are roughly equal instances of low, medium and high probability trials.

A task is defined as “completed” if the button is pressed enough times in the given time frame, and a trial is a “winning” trial if money is earned for task completion. “Success” on this task will be defined as completing a winning trial and earning money, since the ultimate goal of the task is to earn more money. Even if a trial is completed, it may or may not be a “winning” trial. After the choice period, participants were presented with a 1 s “Ready?” prompt and then proceeded to the trial. After completing the trial, participants were told whether or not that trial resulted in a “win” or “no win”, as well as

how much money they won if it was a “win” result. They were informed that actual compensation was determined via random selection of two winning trials. All participants were presented trials in the same order, such that the probability level and whether or not the trial was “winning” was the same for each participant.

Participants were given two 10 min sessions to complete as many trials as they like. It was explained that choosing many hard-task trials at the beginning of the time period may take up more of the overall time, which may limit the occurrence of “high value, high probability” trials that would appear in the sequence. Participants received no information about the order or frequency of trial types, so as to avoid particular strategy selections.

The EEfRT is run through Matlab (Matlab for Windows, Rel. 2012b. Mathworks Inc., Natick, MA) using the Psychtoolbox version 2.0. Final scores of behavioral effort were calculated as the proportion of “hard” task choices made. Behavioral disengagement was then defined as a reduction in behavioral effort, from one session to the next. That is, choosing fewer “hard” tasks during Session 2, as compared to Session 1, is viewed as behavioral disengagement.

Goal Appraisals: Attainability and Importance

The primary goal appraisals assessed were goal attainability and goal importance, using items that were created specifically in reference to completing the EEfRT task. They were based on past studies assessing goal appraisals using similar methods and phrasing (Salmela-Aro & Suikkari, 2008; Brandstätter et al., 2013). Each construct was measured using 7-point Likert-type scale. The responses to these items are then summed

as a total measure of attainability. Goal importance was measured with a single item: “It is important for me to succeed at this task” (see Appendix C for full measure). Additional items referencing general topics such as mood and academics were added so as to avoid giving away the purpose of this measure. The attainability subscale of this measure demonstrated acceptable internal consistency within the given sample (Chronbach’s $\alpha = 0.74$). To ensure that increases in the attainability measure reflected viewing the task as more attainable, items that were phrased negatively or reflected a lack of attainment were reverse coded. All attainability items were then summed to create a final attainability measure, with high values reflecting a more attainable goal.

Procedure

Participants provided informed consent if they were at least 18 years of age. Participants who were 17 provided informed assent, once consent was received from their legal parent or guardian via email. They were then given the initial assessments: CESD and GAS. After completing baseline measures, they were asked to report which hand is their dominant hand², and received instructions about the EEfRT. They then received the first measure of goal attainability and importance (Time 1) and completed the four practice trials of the EEfRT task, followed by the second goal attainability/importance measure (Time 2). Participants then began the first 10-minute session (Session 1) of the EEfRT task trials, followed by the third goal attainability/importance measure (Time 3). Finally, they completed the second 10 m session (Session 2) and afterwards filled out the

² Information on handedness was gathered to ensure that one’s dominant hand is used for the easier task and non-dominant hand was used on the harder task to ensure consistency in difficulty across participants.

fourth goal attainability/importance measure (Time 4). Upon completion of all measures, participants received a monetary reward³.

Data Analysis Plan

Sample size estimates were determined through an a priori power analysis via G*Power (Version 3.1; Faul et al., 2007). Results indicated that a sample of at least 224 participants is needed in order to achieve a power of 0.8 at an alpha level of 0.05, based on recommended standards to meet a moderate effect size for mediation using the Baron and Kenny method (Baron & Kenny, 1986; Fritz & MacKinnon, 2007). Given that the final sample contained 134 participants, there was not adequate statistical power, impacting the ability to detect significant associations of interest.

SPSS (v.23; IBM Corp, 2015) was used to conduct all preliminary analyses and bivariate correlations. Normality and linearity assumptions were tested to ensure that regression models are appropriate for the data. Although the behavioral disengagement variable showed a leftward skew, removing the two outliers responsible for this skew did not significantly change results. Given that these participants' responses still demonstrated realistic and valid performance, they were included in analyses to maximize amount of data.

Moderation and mediation analyses were conducted using MPlus 8 (Muthén & Muthén, 2016). For each test of moderation, a model was created in which the outcome is regressed on both the primary predictor (P) and moderating variable (M), as well as a

³ For ease of accounting, each participant received \$3.00 as their monetary bonus.

variable that captures the interaction effect between the two (PxM). Moderation was then determined via significance of this interaction term.

Mediation analyses were conducted following guidelines proposed by Zhao et al. (2010). For the primary mediation model, the direct effect of interest is that between depression and behavioral disengagement, in which a positive association is expected. In order to establish attainability change as a mediator, its relationship with each of these constructs was examined first. Given that attainability is expected follow a direct relationship alongside effort, it is expected that reductions in attainability will positively predict increases in behavioral disengagement, as it represents reductions in effort. The prediction that depression will be associated with lower perceptions of attainability, as well as greater reductions in attainability, was also examined. To test for mediation, two models were created, in which both contain the primary variables of interest (i.e., behavioral disengagement and depression), but only one contains the mediating variable (i.e., change in attainability perceptions). This allows for significance testing of the indirect effect of the predictor on the outcome variable, via the mediator of interest. Mediation is considered present if there is a significant indirect effect, and type of mediation depends whether or not there is a direct effect of the predictor on the outcome.

Several indices will be estimated for both moderation and mediation models: p-value, Comparative Fit Index (CFI), Tucker-Lewis Index (TFI), and the Root Mean Square Error of Approximation (RMSEA).

CHAPTER III

RESULTS

Preliminary Analyses

Preliminary analyses were conducted to examine descriptive statistics, correlations between variables of interest, and ensure that normality assumptions were met. Due to difficulties with survey administration, demographic information was available only for 74 participants. Demographics for these participants are as follows: 82% female, 15% male, 3% other gender identity; 46% Black/African American, 35% White, 14% Hispanic/Latinx, 4% Asian, 1% Middle Eastern/Arab/North African. Mean age was 20 (min = 18, max = 36, SD = 3.4). With regards to mass screening procedures, six participants were retained in analyses, with a mean depression score of 24.83 (SD = 11.02).

Means and standard deviations for key variables that did not depend on time are presented in Table 1. Means and standard deviations for remaining variables are presented by session in Table 2. Missing data was not present among the primary variables for any of the participants included in the analyses.

All correlations are shown in Table 3 and Table 4. Given the large number of attainability variables, Table 3 contains all primary variables and the change in attainability variables, whereas Table 4 includes correlations with discrete attainability

scores at each time point. Key pairwise relationships within the models of interest will be discussed where relevant.

Primary Analyses

Hypothesis 1A: ‘Discrete Model’ – Depression Predicts Behavioral Disengagement, Partially Mediated by Discrete Attainability Perceptions

The primary relationship between depression and behavioral disengagement was examined first. Contrary to hypotheses, CES-D scores was associated with effort (proportion of hard trials selected) during neither Session 1 nor Session 2. Nor did effort predict behavioral disengagement (reduction in effort), ($r = 0.10, p = 0.271$).

Associations between discrete attainability and depression were considered next. Intriguingly, depression predicted initial perceptions of attainability, but those predictions showed declining magnitude and significance with each subsequent time point (**T1**: $r = -0.32, p = 0.000$; **T2**: $r = -0.20, p = 0.019$; **T3**: $r = -0.12, p = 0.182$; **T4**: $r = -0.08, p = 0.371$). When all discrete measures of attainability were included in a model predicting depression, only attainability at Time 1 was associated with depression ($B = -0.86, \beta = -0.30, p = 0.003$). Overall it seems the primary conclusion that can be drawn is that higher levels of depressive symptoms predicted lower initial perceptions of attainability.

The final pairwise associations considered are those between discrete attainability and effort during each session, followed by associations between discrete attainability and behavioral disengagement. Interestingly, it was only during Session 2 that attainability perceptions significantly predicted subsequent effort. That is, attainability at T3 was positively correlated with effort during Session 2 ($r = 0.25, p = 0.003$), even

when controlling for initial (T1) attainability ($B = 0.02$, $\beta = 0.29$, $p = 0.005$). In other words, individuals with higher attainability ratings just prior to Session 2 chose a greater proportion of hard tasks during Session 2. Session 1 showed a similar relationship, in which T2 attainability predicted subsequent effort, but this relationship was weaker and non-significant ($r = 0.16$, $p = 0.60$). However, it was significant after controlling for initial attainability ($B = 0.02$, $\beta = 0.28$, $p = 0.002$). It seems that, after parsing out effects of initial perceptions, attainability directly before the task predicted effort, such that viewing the task as more attainable was associated with greater effort exertion.

The primary component of this hypothesis describes a model in which depression is positively associated with behavioral disengagement and in which this association is mediated by discrete attainability perceptions (Figure 1). In other words, it was expected that greater depressive symptoms would predict lower attainability perceptions, and thus greater behavioral disengagement. Given the relationship between depression and initial attainability, discrete attainability at T1 was examined in the model. Given that the model was fully saturated, fit indices are not presented. However, this model did not result in significant indirect effects ($\beta = -0.001$, $p = 0.968$). The same was found even when controlling for failures during Session 1, providing no evidence to support this mediation model. Refer to Table 4 for complete results.

In order to follow up on these results, two additional models were examined to explore if depression predicted discrete effort (rather than disengagement), mediated by discrete attainability. Two models were examined, one for each session (Table 5). Given

that the model was fully saturated, fit indices are not presented. However, neither model demonstrated significant effects.

Hypothesis 1B: ‘Change Model’ – Increasing Failures will Predict Reductions in Attainability Perceptions, Moderated by Depression, and these Reductions Predict Greater Behavioral Disengagement

It was expected that the number of failures during a session would predict the change in attainability perceptions across the session, such that a greater number of failures would show a decline in perceived attainability. The number of failures during session 1 did not predict the change in attainability across session 1 ($r = -0.004$, $p = 0.959$), even when controlling for initial attainability perceptions at T1 ($p = 0.830$). Similarly, failures in session 2 did not predict session 2 changes in attainability ($r = 0.07$, $p = 0.394$), even when controlling for initial attainability perceptions at T1 ($p = 0.404$).

Next, the moderation model within this hypothesis was examined. Moderation analyses were conducted with respect to each session, examining models in which failures during the session predict subsequent attainability ratings, while controlling for initial attainability (Table 6). Given that the model was fully saturated, fit indices are not presented. Unfortunately, neither model demonstrated a significant interaction term.

The second component of the model was the association between changes in attainability and behavioral disengagement (i.e., changes in effort). Given that the only possible measure of behavioral disengagement in this study was the change from Session 1 to Session 2, attainability was examined just prior to Session 1 and Session 2, at Time 2 and Time 3, respectively. As hypothesized, the change in attainability from Session 1 to

Session 2 negatively predicted subsequent behavioral disengagement from Session 1 to Session 2 ($r = -0.21, p = 0.014$). In other words, individuals who showed a decline in attainability perceptions after Session 1 also showed a decline in effort (fewer ‘hard’ tasks) after Session 1, and thus demonstrated greater behavioral disengagement from the task. This was true even when controlling for initial attainability perceptions and failures during Session 1 ($B = -0.01, \beta = -0.24, p = 0.007$). Refer to Table 7 for complete results.

Hypothesis 2: Attainability Changes Predict Behavioral Disengagement, Moderated by Importance

Given that there was a significant negative association between change in attainability and disengagement, a moderation analysis was conducted to determine if this association is moderated by perceptions of task importance (Table 8). Given that the model was fully saturated, fit indices are not presented. In a model where attainability change across Session 1 (T2 to T3) and importance predicted subsequent behavioral disengagement, the interaction between attainability and importance was not significant ($\beta = -0.102, p = 0.701$). Thus, there is insufficient evidence for moderation.

To analyze these constructs more thoroughly, it was then examined if importance might moderate relationships between discrete attainability perceptions and subsequent effort. Again, recall that attainability significantly predicted subsequent effort, when controlling for initial attainability, for both sessions. A moderation model was conducted with respect to each session (Table 8). Given that the model was fully saturated, fit indices are not presented. Unfortunately, neither model demonstrated a significant interaction term.

Hypothesis 3: General and Behavioral Disengagement will be Positively Correlated

This hypothesis predicts that there will be a significant positive relationship between general disengagement as measured by the GAS and behavioral disengagement from the EEfRT. Although there was a weak positive correlation in the expected direction ($r = 0.13$), this correlation was not significant ($p = 0.149$).

CHAPTER IV

DISCUSSION

Summary

This study aimed to clarify several questions about the nature of self-regulation in the context of depression. More specifically, the goal was to better understand the relationship between depressive symptoms and behavioral disengagement on task, considering certain cognitive mediators. Past research has demonstrated that depression is associated both with difficulties in disengagement as well as a tendency to disengage prematurely (Wrosch, Scheier & Miller, 2013; Koppe & Rothermund, 2017). To further contribute to this research, I sought to reaffirm an association between depression and behavioral disengagement, as well as illuminate some key issues in depression, specifically through understanding the manner in which depression might pull one away from potentially positive experiences. In order to expand upon past research, a novel use of the Effort Expenditure for Rewards Task was relied upon to examine changes in effort across time. This allowed for a behavioral measure of disengagement within a lab task, a method that is currently sparse within the literature. Using this approach, I was also able to examine how perceptions of attainability changed across time and how these changes relate to disengagement via reductions in effort. Further, I was able to explore the role of failure in these changing perceptions in the context of depression, as well as the possible moderating role of importance perceptions. Finally, I hoped to address an important gap

in the literature by examining if a widely used self-report measure of disengagement is associated with a behavioral measure of disengagement.

Primary Findings

The primary hypothesis of this study sought to clarify a multifaceted relationship between depression and behavioral disengagement through perceptions of attainability. The first model within this hypothesis examined the direct and indirect effects of depression on behavioral disengagement, alongside the mediating effects of discrete attainability perceptions (Figure 1).

Surprisingly, depressive symptoms, as measured by the CES-D, were not associated with behavioral disengagement on the task. One, more rudimentary, explanation for this is that limits to statistical power may have impacted the detection of significant results (see limitations for more detail). There may also be a number of theoretical reasons as to why the association was not significant in the given study. For one, the mechanism of action proposed by this study is that periods of heightened depressive symptoms result in the lowered attainability perceptions and lowered energy that ultimately lead to greater levels of behavioral disengagement, through greater reductions in effort. This discrete lab task may not have accurately captured the variations in depressive symptoms at the state-level within the time period of the study session. Similarly, limitations in recruitment from mass screening prevented a full range and broader distribution of depressive symptoms, clouding deviations that may have been captured with more depressed individuals.

Another consideration as to why support for this model was not found may be explained by the lack of difficulty inherent in the task. MIT argues that people will engage effort until they reach a certain threshold (Richeter et al., 2016). For instance, they may increase effort for more difficult tasks until they reach a personal “maximum difficulty” and then retract effort. Additionally, recall theories that suggest people with depression may disengage sooner because they reach this threshold sooner (Silvia et al., 2016). The analyses within this study may have been limited because the task difficulty was not high enough to allow participants to reach this threshold, thus clouding deviations that may have otherwise resulted from varying depressive symptoms.

The second model within this first hypothesis was concerning the association between attainability perceptions and failures on the task, and the moderating role of depressive symptoms. Interestingly, and somewhat contrary to expectations, failures during the session did not predict a change in attainability perceptions across the given session. One explanation for these findings may stem from problems with the failure construct in this study. The low occurrence of failures on the task and lack of variability in their distribution may have limited the ability to detect any effects. Furthermore, it’s possible that the impact of failures shows an accumulative effect, such that the more failures you experience the more likely you are to view things as less attainable. The failures experienced by participants on this task may not have reached a level necessary for detecting attainability changes within the sample. Contrary to hypotheses, depressive symptoms did not moderate this association. Again, the lack of significant moderation could be explained by the difficulties in the failure construct as previously mentioned.

However, it may also be that individuals respond to failures similarly on this particular task, regardless of depression. Although difficult to speculate given the low frequency of failures, depressive responses to goal difficulties (i.e., failure) may depend partly on personal salience and contextual of the goal, above and beyond monetary incentive, as described in the literature (Salmela-Aro & Suikkari, 2008; Richeter et al., 2016). Thus, this type of task failure may not capture reactive differences one might see among people with depression.

Despite the lack of support for mediation, some interesting findings are worth discussing. For one, change in attainability did indeed predict behavioral disengagement, as described above. Additionally, depression was associated with attainability to some degree. While it was not related to any change in attainability, it was significantly associated with initial attainability perceptions, wherein individuals with higher levels of depressive symptoms rated success on the task as less attainable at time 1 and time 2. This is in line with theories positing that people with depression tend to make more negative attributions overall, including appraisals of goals (Ghassemi et al., 2017). Rooted within this theory is evidence demonstrating a negative attentional bias and overall negative cognitive schema that might explain this finding (Hu et al., 2015). Why then was this association significant only at the first two time points, and why was depression not associated with changes in attainability? One speculation is that factors impacting changes in attainability perceptions do not necessarily function differently for people with or without depression. Simple and less personally salient tasks may have less of a range in perceptions. For instance, there may be fewer individual differences in

perceptions around earning \$3.00 as compared to finding a romantic partner. Without experience on the task individuals may operate more on implicit biases at first, explaining the deviations in initial perceptions. However, once they gain experience, there may be some level of “regression to the mean, as it were, and the individual differences are no longer present. A different task, such as one that is more personally salient and has more frequent or significant failures, may better capture the associations of interest.

The second hypothesis predicted that attainability perceptions would be negatively associated with behavioral disengagement, moderated by perceptions of importance. Given that behavioral disengagement was conceptualized as a reduction in effort from session 1 to session 2, it was examined in association with the change in attainability perception that occurred just prior to session 2. Results showed that individuals who showed a decline in attainability perceptions also showed a moderately greater amount of behavioral disengagement. It is theorized that this reduction in effort on the task resulted, in part, because participants viewed the task as less attainable (Ghassemi et al., 2017). This may serve as an adaptive response to conserve energy and resources where they might otherwise be wasted.

The temporal association between these two variables also helps establish some evidence of causality. In addition to examining the relationship between attainability perceptions and behavioral disengagement, the moderating role of importance perceptions was also considered. This is because people may be willing to put forth more effort for more important or desirable tasks, according to motivational intensity theory (Richeter et al., 2016). Results were not in line with these expectations, however. There

was not sufficient evidence to conclude that importance serves as a moderator, and this may be partly due to the limited importance of the given task: participants were undergraduate students completing the task for course credit and modest monetary incentive (\$3.00). Thus, the task may not have been important enough to alter the impact of attainability on disengagement.

The final hypothesis examined the relationship between general disengagement, as measured by the Goal Adjustment Scale (GAS), and behavioral disengagement on the EEfRT task. Not only was the use of the EEfRT as a measure of disengagement a novel approach, research has not yet compared behavioral and general disengagement directly to determine if they demonstrate concurrent validity. Despite expectations, no significant association was found between these two constructs. It may be that there was insufficient power in this study to reach statistical significance. It may also be the case that behavioral effort on a lab task, such as the EEfRT, does not reflect the same type of disengagement considered within the GAS. These items are designed to reflect overarching patterns of responding to difficulties on broad, personally salient goals (i.e., “If I have to stop pursuing an important goal in my life...”). As such, it may not capture one’s pattern of behavior on short tasks, within a controlled environment, and with limited difficulties, as was the case in this study. Additionally, general patterns are not always reflective of individual instances, and one’s self-reported retrospective tendencies may not always match actual performance.

A final limitation of this study may stem from the measure of goal appraisals. Within the literature, there are no consistently used measures of how one perceives the

attainability or importance of a goal. While we relied on past work, there may have been limitations to the validity of the current measures. Attainability was assessed with 5 items that simply asked participants about how likely success on the task would be. Importance was assessed with only one item. Use of more comprehensive and statistically sound measures of goal appraisals may help to address some of the difficulties within this study. Including multiple measures of this kind may also help to establish reliability of measuring these constructs. Further, it may be helpful to go beyond self-reports of attainability and importance by manipulating these constructs directly. Modulating the likelihood of success (perhaps by actually changing task difficulty or odds of winning) and the importance of success (through varying incentives) might allow for a more controlled scenario in which these questions could be accurately assessed and remove the bias of self-report. Future work may benefit from including both types of measures however, as self-report still has salience in the context of depression, given that depression is hypothesized to skew perceptions, even when they are distinguished objectively.

Future Directions

The findings from this study pave the way for a number of directions in future work. For starters, the task should be made difficult enough to allow for greater variability and frequency of failures, and incentives should be made valuable enough to encourage meaningful effort on the task. In this case it would be necessary to control for individual differences in ability on the task as well.

Much of the past work on goal appraisals and self-regulation around goals has considered the combined and interactive effects of both attainability and importance perceptions (Ghassemi et al., 2017; Salmela-Aro & Suikkari, 2008; Haratsis et al., 2015). Future work that focuses on modifying these constructs directly within controlled settings may better capture the variability associated with depression and behavioral disengagement than studies relying solely on self-report. They would also help build upon this work by including self-report measures of goal appraisals as well, to help establish convergent validity alongside the manipulated appraisal conditions. More work needs to be done to establish more statistically sound measures of goal appraisals across a variety of goal types, from personally salient goals to more menial tasks. It would also be worthwhile to expand upon this study by examining how goal appraisals change over time in the face of varying difficulties and incentives, as well as the factors that moderate these variations. This would better inform the nature of goal perceptions amidst self-regulation.

One of the exploratory goals of this was to determine if depression is associated with attainability perceptions by moderating responses to goal difficulties, in this case failures on the task. The limitations of the “failure” construct appeared to prevent effective exploration of this hypothesis. However, this is certainly still a useful contribution to the literature: do individuals with depression respond differently to failures toward a goal? Of course, this would come along with a number of associated questions of interest: what symptoms or periods of depression specifically predict response to failure? Does the importance or personal salience of the goal matter in this

context? To what degree do differential responses to failure predict changes in goal appraisals and behavioral disengagement? Better understanding these questions would help inform the mechanisms through which depression may interact with cognition to predict self-regulatory behaviors.

Although evidence for the mediation model was not found, there were interesting associations found between sub-components of the model: depression was associated with initial attainability and behavioral disengagement was associated with prior change in attainability perception. To better evaluate this hypothesized mediation model, relationships surrounding depression, attainability and disengagement should be explored in more detail. Including additional time points would first allow for multiple comparisons between the constructs of interest, such as behavioral disengagement which may show trends across time. Analyses could examine whether or not there exists a “threshold” of attainability, at which disengagement occurs, if the task is designed in a way to encourage disengagement. This would help clarify why changes in attainability predict disengagement, even when depression does not seem to account for attainability changes. Instead, these additional time points could allow for analyzing if depression moderates the point at which this “threshold” is reached. Taking this approach alongside addressing the current study limitations (power, multi-measure, etc.) may allow for a richer exploration of the question at hand.

This study has allowed for the exploration of some key relationships underlying the observed association between depression and premature behavioral disengagement. Despite its limitations, the findings inform a number of potential future directions to

better understand the nature of self-regulation around goals in the context of depression, which may further help to improve our understanding and treatment of depression.

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APPENDIX A

CES-D SCALE

Center for Epidemiologic Studies Depression Scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past			
Week				
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I did not feel like eating; my appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I felt I was just as good as other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I had trouble keeping my mind on what I was doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I felt that everything I did was an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I felt hopeful about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I thought my life had been a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I felt fearful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I was happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I talked less than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I felt lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. People were unfriendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I enjoyed life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I had crying spells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I felt that people dislike me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I could not get "going."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

APPENDIX B

GOAL ADJUSTMENT SCALE

Goal Adjustment Scale (GAS)

During their lives people cannot always attain what they want and are sometimes forced to stop pursuing the goals they have set. We are interested in understanding how you usually react when this happens to you. Please indicate the extent to which you agree or disagree with each of the following statements, as it usually applies to you.

If I have to stop pursuing an important goal in my life...	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. It's easy for me to reduce my effort towards the goal.					
2. I convince myself that I have other meaningful goals to pursue.					
3. I stay committed to the goal for a long time; I can't let it go.					
4. I start working on other new goals.					
5. I think about other new goals to pursue					
6. I find it difficult to stop trying to achieve the goal.					
7. I seek other meaningful goals.					
8. It's easy for me to stop thinking about the goal and let it go.					
9. I tell myself that I have a number of other new goals to draw upon.					
10. I put effort toward other meaningful goals.					

APPENDIX C

GOAL APPRAISALS MEASURE



THE UNIVERSITY of NORTH CAROLINA
GREENSBORO

ID Number: _____

Date: _____

The following statements refer to the computer task that you are about to **practice**, as well as your current mood. Please read each one carefully. Circle the response that best indicates how much you agree with the statement.

1. I feel happy.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
2. This task will be difficult.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
3. I will be able to win many hard trials.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
4. It is important for me to succeed at this task.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
5. I enjoy doing tasks on the computer.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
6. I will be able to win many easy trials.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
7. I expect that I will succeed on this task.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
8. I feel frustrated.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree
9. It will be difficult for me to succeed on this task.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

vi

Attainability Items: 2, 3, 6, 7, 9

Importance Item: 4

APPENDIX D

TABLES

Table 1

Descriptive Statistics of Primary Variables

Variable	N	Mean	SD	Skew	Kurtosis
Depression (CESD)	134	17.40	10.91	1.08	0.73
General Disengagement	134	9.85	3.29	0.41	0.11
Behavioral Disengagement	134	-0.05	0.20	-1.19	4.89
Attainability (Average)	134	19.35	3.26	0.25	-0.78
Importance (Average)	134	4.16	1.47	-0.15	-0.30

Table 2

Descriptive Statistics of Primary Variables

Variable	N	Session 1				Session 2			
		Mean	SD	Skew	Kurtosis	Mean	SD	Skew	Kurtosis
Attainability Change	134	2.91	4.11	0.47	0.62	0.66	2.87	-0.04	1.58
Proportion Hard	134	0.40	0.22	-0.52	-0.51	0.45	0.26	-0.05	-0.77
Failures	134	1.23	2.13	3.20	12.45	0.42	1.05	3.09	9.73

Table 3

Pairwise Correlations between Primary Variables

Variable	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Depression	.176**	.096	.064	-.021	-.320 [†]	-.203**	-.116	-.078	.082	.051	.009	.063	-.065
2. General Disengagement	—	.125	-.048	-.137	-.101	-.043	-.138	-.123	-.102	.012	.101	.182*	-.098
3. Behavioral Disengagement		—	.233 [†]	-.577 [†]	-.027	.051	-.152*	-.195**	-.211**	-.082	-.160*	.030	-.139
4. Effort (S1)			—	.660 [†]	-.060	.163*	.160*	.046	.005	-.168	-.327 [†]	-.375 [†]	.035
5. Effort (S2)				—	-.030	.097	.251 [†]	.189**	.167	-.078	-.151	-.339 [†]	.137
6. Attainability (T1)					—	.568 [†]	.285 [†]	.173**	-.270 [†]	-.156	-.050	-.015	.218**
7. Attainability (T2)						—	.531 [†]	.378 [†]	-.446 [†]	-.200**	-.173**	-.179**	.153
8. Attainability (T3)							—	.793 [†]	.522 [†]	-.248 [†]	-.169*	-.204**	.079

9. Attainability (T4)	—	.457 [†]	.394 [†]	-.078	-.146 [*]	.084
10. Attainability change (S1)		—	-.060	.132	.074	-.070
11. Attainability change (S2)			—	-.030	-.112	.014
12. Failures (S1)				—	.693 [†]	-.067
13. Failures (S2)					—	-.113
14. Importance						—

Note. S1 = “Session 1”, S2 = “Session 2”, T1 = “Time 1” (etc.).

*p < .10. **p < .05. †p < .01.

Table 4

Mediating Effects of Initial Attainability

Parameter	Estimate	SE	P-Value
Behavioral Disengagement ON			
Depression	0.097	0.090	0.283
Attain (T1)	0.004	0.091	0.968
Depression (indirect)	-0.001	-0.040	0.968

Note. $\chi^2=0$ (0), RMSEA=0, CFI=1, TLI=1

Table 5

Mediating Effects of Prior Attainability on Depression and Effort

Session 1			
Parameter	Estimate	SE	P-Value
Effort ON			
Depression	0.101	0.086	0.243
Attain (T2)	0.183	0.085	0.032
Depression (indirect)	-0.037	0.023	0.110
Session 2			
Parameter	Estimate	SE	P-Value
Effort ON			
Depression	0.009	0.084	0.918
Attain (T3)	0.252	0.081	0.002
Depression (indirect)	-0.029	0.024	0.215

Note. $\chi^2=0$ (0), RMSEA=0, CFI=1, TLI=1 for all models

Table 6

Moderating Effects of Depression on Failures and Attainability

Session 1			
Parameter	Estimate	SE	P-Value
Attain (T3) ON			
Depression	0.005	0.109	0.964
Failures (S1)	-0.066	0.194	0.733
Attain (T1)	0.270	0.084	0.001
Depr X Fail	-0.104	0.205	0.612
Session 2			
Parameter	Estimate	SE	P-Value
Attain (T4) ON			
Depression	-0.003	0.100	0.973
Failures (S2)	-0.102	0.167	0.539
Attain (T1)	0.169	0.089	0.057
Depr X Fail	-0.049	0.174	0.778

Note. $\chi^2=0$ (0), RMSEA=0, CFI=1, TLI=1 for all models

Table 7

Behavioral Disengagement Regressed on Attainability Change

Parameter	B	SE	Beta	t	P-Value
Behavioral Disengagement ON					
(Constant)	0.101	0.088		1.152	0.251
Attain Change (S1)	-0.012	0.004	-0.239	-2.739	0.007
Attain (T1)	-0.005	0.005	-0.100	-1.148	0.253
Failures (S1)	-0.016	0.008	-0.167	-1.977	0.050

Note. $\chi^2=0$ (0), RMSEA=0, CFI=1, TLI=1

Table 8

Moderating Effects of Importance on Disengagement and Attainability

Attainability Change			
Parameter	Estimate	SE	P-Value
Behavioral Disengagement ON			
Attain Change (S1)	-0.127	0.262	0.629
Import	-0.130	0.105	0.218
Attain X Import	-0.102	0.266	0.701
Discrete Attainability (Session 1)			
Parameter	Estimate	SE	P-Value
Effort ON			
Attain (T2)	0.287	0.266	0.280
Import	0.199	0.385	0.606
Attain X Import	0.245	0.491	0.617
Discrete Attainability (Session 2)			
Parameter	Parameter	Parameter	Parameter
Effort ON			
Attain (T2)	0.085	0.254	0.739
Import	-0.169	0.446	0.705
Attain X Import	0.342	0.522	0.512

Note. $X^2=0$ (0), RMSEA=0, CFI=1, TLI=1 for all models

APPENDIX E

FIGURES

Figure 1

'Discrete' Model of Attainability

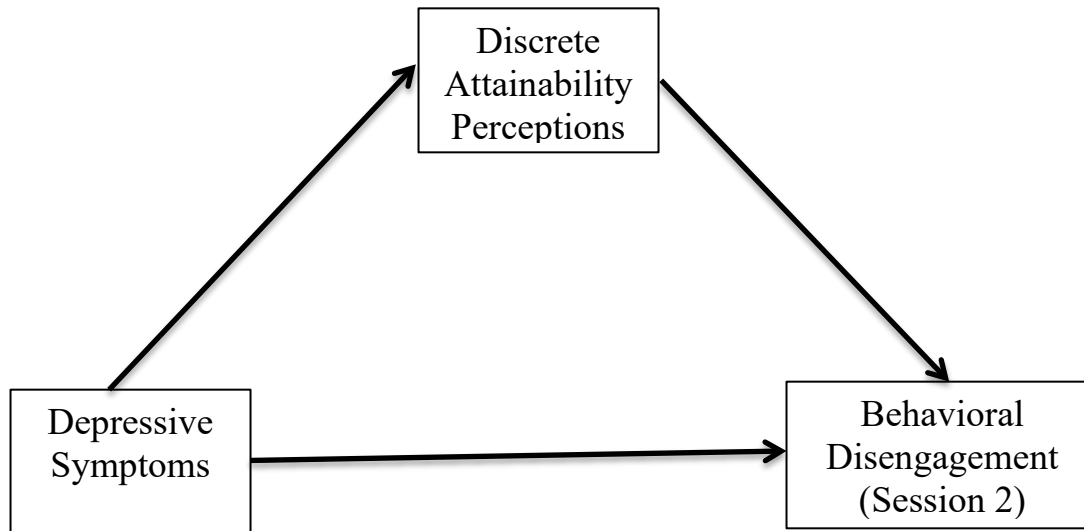


Figure 2

'Change' Model of Attainability

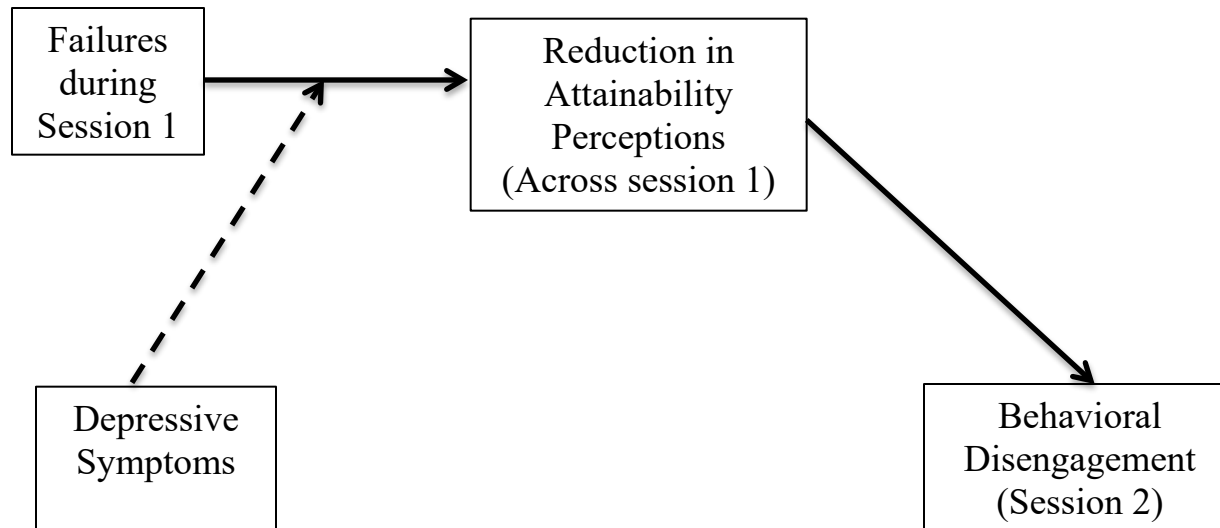


Figure 3

Importance Moderation

